

The opinion in support of the decision being entered today
is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MARK HERNANDEZ and MUNA AHMED ABU-DALO

Appeal 2007-3548
Application 10/627,947
Technology Center 1700

Decided: September 25, 2007

Before BRADLEY R. GARRIS, CHARLES F. WARREN,
and JEFFREY T. SMITH, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

Statement of the Case

This is an appeal under 35 U.S.C. § 134 from a final rejection of claims 1-22, 24, 25 and 28-35.¹ We have jurisdiction under 35 U.S.C. § 6.

¹ Claim 26 has been indicated as containing allowable subject matter by the Examiner (Answer 2).

Representative independent claim 1 appears below:

1. A method, comprising:

in a solution having a specific acidic pH and containing metal cations, adding (i) an amphipathic, heterocyclic, metal-coordinating compound that is selected based, at least in part, on a charge distribution which maintains, at least approximately, a charge neutrality of the amphipathic, heterocyclic, metal-coordinating compound at said specific acidic pH and (ii) a sorbent, such that the addition at the specific acidic pH causes at least some of the metal-coordinating compound to bind with some of the metal cations and at least some of the metal-coordinating compound to sorb to the sorbent, along with any metal cations bound therewith.

The Examiner relies on the following references in rejecting the appealed subject matter:

M. Hernandez, *Investigation of Selected Potential Environmental Contaminants: Benzotriazoles*, EPA 560/2-77-001, Final Report 59-84 (Feb. 1977)

Brian E. Reed and Sujith Kumar Nonavinakere (hereafter "Reed"), *Metal Adsorption by Activated Carbon: Effect of Complexing Ligands, Competing Adsorbates, Ionic Strength, and Background Electrolyte*, 27 Separation Science and Technology no. 14, 1985-2000 (1992)

C. L. Gruden, *Fate and Toxicity of Aircraft Deicing Fluid Additives through Anaerobic Digestion*, Doctoral Thesis 1-123 (University of Colorado, July 2000)

The following grounds of rejection to be reviewed:

Claims 1-22, 24, 25, and 28-35 stand rejected under 35 U.S.C.

§103(a) as unpatentable over Gruden in view of Reed; claim 34 also stands rejected under 35 U.S.C. §103(a) as unpatentable over Hernandez.

Appellants' invention relates to a method for the removal of metal cations from an acidic solution. The method includes the use of a metal

binding compound to bind a metal cation, and a sorbent to sorb the compound and allow the compound and the metal cation bound thereto to be removed from the acidic solution. The Specification states: “granular activated carbon and a benzotriazole may be added to a metal containing solution, such as an acid mine drainage, or industrial wastewater, in order to coordinate the bind [to] the metal with benzotriazole, and sorb the benzotriazole to the activated carbon, and remove the resulting three component granular structures by settling, filtering, or other solid separation technique common to the wastewater treatment arts” (Specification 18, ¶ 101).

Appellants describe the suitability of using the claimed invention in specific acidic solutions as follows:

Experiments indicate that the metal binding compounds and sorbents may be used in combination to remove metals from a strongly acidic aqueous solution having a pH between about 2-3, or a moderately acidic solution having a pH between about 3-5, or a mildly acidic solution having a pH between about 5-7. Many terrestrial waters affected by acid mine drainage are strongly or moderately acidic as are many industrial wastewaters. Advantageously, this means that such acidic waters may be treated by the present invention without, or without significant, pH adjustments. Experiments also indicate that the present invention may be used to remove metal ions from solution, such as copper, zinc, cobalt, nickel, gold, and lead, from acid waters having a temperature between about 1-30°C or more favorably between about 5-15°C.

(Specification 21, ¶ 111).

Thus, in the present case, a solution having a pH ranging from 2-7 is an acidic solution.

Activated carbon is one example of a sorbent suitable for use in the present invention. The Specification discloses that activated carbon is used

widely in the water and wastewater treatment industries and is well tested (Specification 10-11, ¶ 75).

Benzotriazoles are suitable metal binding compounds. A metal binding compound is used to bind a metal and assist with removing it from solution. (Specification 13, ¶ 82).

Gruden describes the treatment of waste waters with Methylbenzotriazole (MeBT). MeBT is added to ADF (Aircraft deicing fluid) for corrosion inhibition and reduction of flammability. The purpose of this research was to investigate the fate of MeBT under sustained reducing conditions and assess the toxicity of MeBT to anaerobic treatment systems. MeBT is the subject of this study because it is the ADF component believed to confer the most toxicity to biological waste treatment systems. Results from this work were used to assess whether anaerobic treatment of ADF wastes is viable, the degree to which the corrosion inhibiting additives may affect the degradation of otherwise readily biodegradable substrates (glycol), and to indicate the fate of MeBT in reducing environments. This research is also relevant to other anaerobic environments including saturated soils, stream sediments, and treatment ponds (Gruden 48).

Gruden discloses that the pH for the digesters ranged from 6.9 to 7.2 (Gruden 50).

Gruden discloses that MeBT was toxic to and inhibited the methanogenic activity of anaerobic biomass co-digesting (Gruden 119).

Granular activated carbon (GAC) reduced the apparent toxic effects of MeBT. The GAC concentration used in the experiments was commensurate with the concentration used in actual upflow anaerobic digesters (Gruden 119-120).

Gruden discloses that the results from the research suggest that with some modifications, modern biological treatment practices may be effective in treating wastes containing aircraft deicing fluids, as well as other wastes containing benzotriazole derivatives. Gruden also discloses that due to “the physical/chemical properties of benzotriazole derivatives, specifically their high sorptive capacity on activated carbon, and their ability to strongly chelate heavy metals, make these compounds a candidate for developing novel treatment processes” (Gruden 121).

Gruden concludes the following:

Current novel digester configurations (USAB) [upflow sludge anaerobic blanket] have incorporated GAC as a support matrix to retain high biomass levels. Results from this research indicate that the addition of GAC to an anaerobic treatment system for ADF waste may diminish the toxic effects of MeBT and may eliminate MeBT from the effluent. This design may be fortuitous for other industrial waste streams because MeBT sorbs to GAC while simultaneously binding heavy metals; thus, adding MeBT to PACT [powdered activated carbon treatment] or USAB may enable the treatment of waste streams with very high metals content that would otherwise be toxic.

(Gruden 122-123).

Reed describes the removal of heavy metals by activated carbon from complex waste streams (Reed 1986). Reed studies the effects of varying the pH on the removal of the heavy metals (Reed 1987). Reed reports results in the form of graphs that depict results for streams having an acidic pH to basic pH (Reed 1992-1998).

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations. *Graham v.*

John Deere Co., 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966). “[A]nalysis [of whether the subject matter of a claim would have been obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int’l Co., v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007) quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006); see also *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1361, 80 USPQ2d 1641, 1645 (Fed. Cir. 2006) (“The motivation need not be found in the references sought to be combined, but may be found in any number of sources, including common knowledge, the prior art as a whole, or the nature of the problem itself.”); *In re Bozek*, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969) (“Having established that this knowledge was in the art, the examiner could then properly rely, as put forth by the solicitor, on a conclusion of obviousness ‘from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference.’”); *In re Hoeschele*, 406 F.2d 1403, 1406-07, 160 USPQ 809, 811-12 (CCPA 1969) (“[I]t is proper to take into account not only specific teachings of the references but also the inferences which one skilled in the art would reasonably be expected to draw therefrom . . .”). The analysis supporting obviousness, however, should be made explicit and should “identify a reason that would have prompted a person of ordinary skill in the art to combine the elements” in the manner claimed. *KSR*, 127 S. Ct. at 1739, 82 USPQ2d at 1396.

To properly address the issue before us, we must analyze the claim language to determine the scope and meaning of each contested limitation. *See Gechter v. Davidson*, 116 F.3d 1454, 1457, 43 USPQ2d 1030, 1032 (Fed. Cir. 1997). In so doing, we give the terms of the appealed claims their ordinary meaning unless we find that another meaning is intended by Appellants.

By virtue of using the transitional language “comprising,” the claimed invention does not preclude the presence of additional components in the polymerization. *In re Baxter*, 656 F.2d 679, 686, 210 USPQ 795, 802 (CCPA 1981) (“As long as one of the monomers in the reaction is propylene, any other monomer may be present, because the term ‘comprises’ permits the inclusion of other steps, elements, or materials.”).

In several of the claims Appellants utilize the term “approximately” to describe the specified pH ranges. The present Specification provides no guidance into the amount of latitude that should be attributed to the range due to the “approximately” claim language. We interpret the claim language to allow for some variation from the stated end point of the range.

Applying the preceding legal principles to the factual findings in the record of this appeal, we determine that the Examiner has established a prima facie case of obviousness for the independent claims 1, 28, 30, 33, and 34. The obviousness rejection has not been adequately rebutted by Appellants’ arguments. We will address Appellants’ arguments substantially in the order as presented in the principal Brief.

Appellants contend that the paragraph of Gruden, bridging pages 122-123, is “exclusively limited to the context of removing heavy metal in an anaerobic digester” (Br. 8). Appellants contend that it is only through a

broad but unreasonable interpretation of this disputed paragraph that the claim limitation of an acidic pH can be met (Br. 10). Appellants' position is not persuasive. As set forth above, Appellants consider a composition having a pH of 7 as mildly acidic. Gruden describes that the tested waste streams had a pH ranging from 6.9 to 7.2. Thus, the streams utilized by Gruden for removing metals had a specific acidic pH within the meaning of the claimed invention.

Appellants' criticism of the Reed reference (Br. 11) is not persuasive. Appellants have not addressed the reasons the Examiner cited the Reed reference. The Examiner cited the Reed reference for describing the use of activated carbon in an acidic environment for removing heavy metals from waste streams solutions. The Examiner reasonably determined that a person of ordinary skill in the art would have found that activated carbon could have been utilized in acidic environments for removal of metals from waste streams (Answer 4). This is especially true in the present case where Appellants consider a pH of 6.9 to be acidic.

Appellants' arguments (Br.12), regarding the subject matter of claim 3 are not persuasive because they are directed to the inherent characteristics of benzotriazoles that are described by the cited prior art.

Appellants' arguments regarding the pH of the dependent claims are not persuasive. As discussed above, the cited prior art establishes that activated carbon is suitable for removing heavy metals from wastewater streams in acidic environments. Appellants' criticism of the Reed reference for not providing data below pH 3 is not persuasive. Read discloses that the activated carbon functions in acidic environments. The pH adsorption edge described in the figures of Reed does not indicate that activated carbon will

not function below the end point presented in the graphs. Reed discloses that there are several characteristics that attributed to the ability of activated carbon to work at lower pH levels (Reed 1987). As such, a person of ordinary skill in the art would have reasonably expected that activated carbon would be suitable for use in removing heavy metals from wastewater streams having a pH of approximately 2. Therefore, Appellants' arguments regarding claims 3, 5, and 7-9 are not persuasive.

We affirm the rejection of the subject matter of claims 11 and 12 for the reasons set forth above. Appellants have failed to explain how the benzotriazole and the activated carbon of the claimed invention differ from that which has been specified in the cited prior art.

Appellants have not provided specific arguments directed to the subject matter of claims 28, 29, 33, 34, and 35. Appellants principally rely upon the arguments presented in the discussion of claim 1 for patentability of these claims. Appellants have failed to explain why the specific subject matter of these claims is patentable over the cited prior art. Thus, for the reasons set forth above in the discussion of claim 1, we affirm the rejection of claims 28, 29, 33, 34, and 35.

We also affirm the rejection of the subject matter of claim 30 for the reasons set forth above. Appellants' identification of the additional features of claim 30, specifically enclosing of the metal coordinating compound and the sorbent in a flow-through enclosure, is not persuasive for patentability. A person of ordinary skill in the art would have recognized that the media employed to purify a waste stream should be placed into an enclosure to prevent the media from flowing with the purified water. The rejection of claim 30 is affirmed.

The subject matter of claims 10 and 13 specifies that the sorbent is an L type of activated carbon. The Appellants recognize that Reed describes an H type of activated carbon. The Examiner has failed to address why the subject matter of the claimed invention would have been obvious over the cited references. Thus, we reverse the rejections of claims 10 and 13.

Appellants contend that the Examiner has failed to provide a specific rationale for support of the rejection of claims 15, 16, 18, 19, and 20 (Br. 13-14) and claims 31 and 32 (Br. 16). We agree with the Appellants. The Examiner has failed to direct us to reasons to support the rejection of the cited claims. As such, we reverse the rejection of claims 15, 16, 18, 19, 20, 31, and 32.

We now turn to the rejection of claim 34 over Hernandez.

The Examiner contends that a person of ordinary skill in the art would have been motivated to perform the process of Hernandez in a solution having a pH of 6.85 (Answer 4-5).

Appellants contend that the suggestion of a pH of 6.85, that is 0.15 lower than neutral, is not suggested by Hernandez (Reply Br. 12).

The issue presented for review is as follows: Has the Examiner reasonably determined that a person of ordinary skill in the art would have been motivated to perform the process of Hernandez in a solution having a pH of 6.85? On this record, we answer the question in the affirmative.

Appellants' arguments regarding the use of a pH below 7 are not persuasive. The present record indicates that the removal of metals from solutions having about a pH 7 was known to persons of ordinary skill in the art. (Note the references cited prior art in the Specification.) As such, a person of ordinary skill in the art would have reasonably expected that

benzotriazoles could have been used to remove metals from waste streams having about a pH 7. Appellants have chosen to describe a pH up to about 7 as acidic. (*See* Specification 21, ¶ 111). Thus, the claim language “any specific acidic pH” does not patentably distinguish the invention from the cited prior art.

Appellants’ arguments regarding the presence of benzene in the system of Hernandez are not persuasive. The claimed invention is open to the inclusion of other components by virtue of the use of the term “comprising.”

CONCLUSION

The rejection of claims 1-9, 11, 12, 14, 17, 21, 22, 24, 25, 28-30, and 33-35 is affirmed. The rejection of claims 10, 13, 15, 16, 18-20, 31, and 32 is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

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